ICHTHYOFAUNA OF ERAVIKULAM NATIONAL PARK WITH NOTES ON TROUT CULTURE IN RAJAMALAI, MUNNAR, KERALA[1]

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(*With five text-figures*)

Key words: Ichthyofauna, distribution, trout culture, Eravikulam National Park, Rajamalai, trout hatchery.

The status and distribution of fishes in the Eravikulam National Park, Kerala were studied. Only four species viz. *Garra hughi, Horalabiosa joshuai, Nemacheilus keralensis* and *Salmo gairdnerii*, belonging to three families were recorded from the Park. This may be due to high altitude, low water temperature and high gradient. Except for the exotic *Salmo gairdnerii*, these species are endemic to the southern Western Ghats, especially to southern Kerala. Some observations on of trout culture are included.

Introduction

Eravikulam National Park is situated in Idukki dist., Kerala. The Eravikulam Plateau and the adjacent areas in the high ranges of Kerala were the lease lands of the Kannan Devan Hills Produce Co. The Park is famous for sustaining the largest surviving population of the endangered Nilgiri tahr, *Hemitragus hylocrius*. This area was declared a Sanctuary in 1972. Because of its outstanding ecological, faunal, flora, geomorphological and zoological significance, the area was declared a National Park in 1978 (Nair 1991). The Park has extensive grasslands interspersed with evergreen shola forests. Eravikulam supports the largest population of the Nilgiri tahr in the world, a viable population that exists without human interference. Anamudi Peak (2694 m), the highest point south of the Himalayas falls in the southern parts of the Park.

Eravikulam National Park is located at 10° 8' N - 10° 19' N lat. and 77° 0' E - 77° 8' E long. and lies in Devikulam taluk of Idukki dist., Kerala. It is bounded by the old Kannan Devan Hills Produce village along the ridges through Kattumudi and Perumamalai in the east; northern boundaries of Chattamunnar, Nyamakad and Vaguvarai estates of Tata Tea Co. in the south; old Kannan Devan Hills Produce village ridges through Rajamalai, Sambamalai and Kolukkumalai in the west. The northern boundary coincides with the interstate boundary between Tamil Nadu and Kerala (Fig. 1). The average elevation of the park is 2000 m above msl. The main plateau is divided roughly in half from northwest to southeast by Turner's Valley. The park is criss-crossed by small perennial streams of Periyar and Pambar rivers, of which Periyar is a west flowing river while Pambar is an east flowing one. The average annual rainfall is 4800 mm: it is one of the wettest areas on earth. Perennial streams, wetlands and marshes increase the ambient water. The isolated sholas act like sponges, giving out water throughout the year.

Results of Faunal Survey:

Samples were collected during December, 1997 and February, 1998 to study the status and distribution of fishes in the streams of Eravikulam National Park. Fish sampling was carried out using cast nets, hooks and a modified form of cast net for small fishes. The specimens were preserved in 10% formalin. Only four species were collected from the Eravikulam National Park; all are typical freshwater fishes. Compared to the other National Park and

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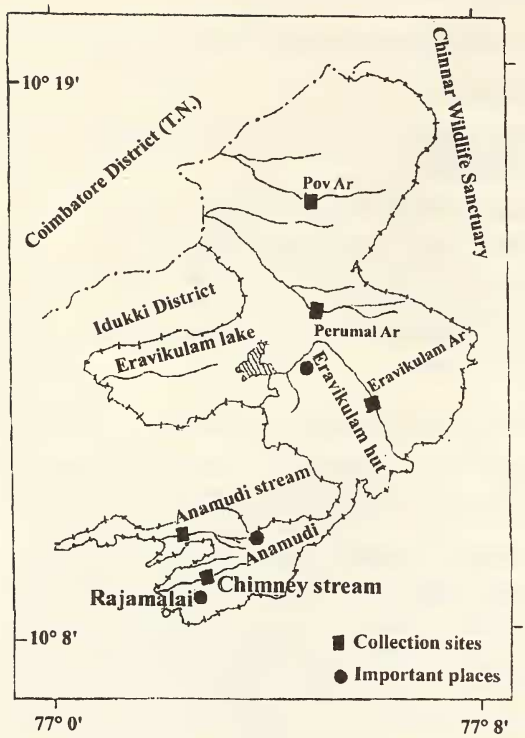

Fig. 1: Map of Eravikulam National Park showing various collection sites

Sanctuaries in Kerala, the fish diversity of Eravikulam National Park is much less. This may be due to high altitude, low water temperature and high gradient. All the streams, including the Eravikulam before the introduction of the Rainbow trout, *Salmo gairdnerii*, were full of an indigenous fish, *Glyptothorax madraspatanus*. This fish species was not represented in collections. The following species were recorded from the Park:

List of species (Figs. 2, 3, 4, 5)

Family: Cyprinidae

1. *Garra hughi* Silas
2. *Horalabiosa joshuai* Silas

Family: Balitoridae

3. *Nemacheilus keralensis* (Rita & Nalbant)

Family: Salmonidae

4. *Salmo gairdnerii* Richardson

1. *Garra hughi* was collected only from Eravikulam stream, a small tributary of Pambar river. It was originally reported from lower Vauguvarae estate, Travancore, Kerala br Silas)1954), in whose original description scales were absent on mid-dorsal streak. Recently Rema Devi observed that the type specimen does have scales on the mid-dorsal streak (pers. comm.). Our specimens also had scales on the mid-dorsal streak.

2. *Horalabiosa joshuai* was described by Silas (1953) from the head-waters of Tamraparni river at Singampatty in the Western Ghats of Tirunelveli dist. Tamil Nadu. Raju Thomas *et al.* (1999) have reported this species from Chinnar Wildlife Sanctuary area of Pambar river. This is the second report of this species from Kerala.

3. *Nemacheilus keralensis* was distributed in almost all streams inside the Park. So far it has been reported only from high altitude streams and is considered a typical hill stream fish. The type locality is Pampadampara, near Munnar, Kerala.

4. The Rainbow trout, *Salmo gairdnerii* was introduced into India from United Kingdom, New Zealand and Sri Lanka in 1869 (Talwar and Jhingran 1991). The young of *S. gairdnerii* were stocked in different streams of Eravikulam National Park and nearby reservoirs. They are now well established there.

Physical features of the habitat, viz. width, depth, substrate distribution, land use pattern, nature of water and flow rate were assessed at various collection sites. The water temperature ranged between 13°-18°C and is the most important factor for the survival of the above species, especially trout. During the sampling time the flow of water ranged between 20-25 cm/sec; width and depth of streams were less, i.e. 2-4 m and 10-25 cm respectively. Around most of the collection sites, there were tea and eucalyptus plantations and southern montane wet grassland with small patches of montane wet temperate

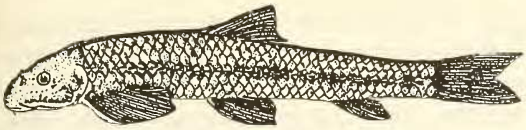

Fig. 2: *Garra hughi* Silas

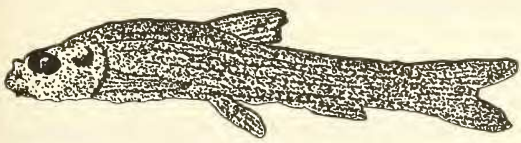

Fig. 3: *Horalabiosa joshuai* Silas

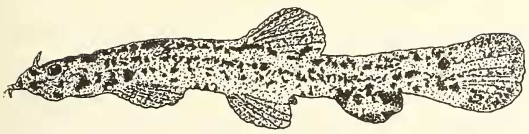

Fig. 4: *Nemacheilus keralensis* (Rita & Nalbant)

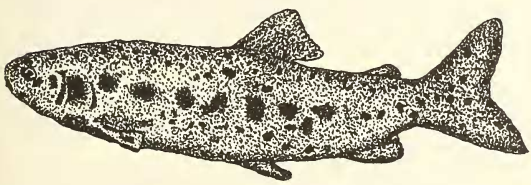

Fig. 5: *Salmo gairdnerii* Richardson

forests known as 'Sholas'. Water is almost clear in all the streams. Regarding the substratum, mud, sand and detritus were less compared to gravel, cobble, boulder and bedrock. The pH ranged around 6.9 and the DO values ranged between 6 and 7 ppm.

Trout culture in Rajamalai

Fish culture in the uplands of India began with the introduction of exotic fishes in 1899. The first ever hatchery for Brown Trout in India was made by Mitchell (Jhingran & Sehgal 1978). Artificial propagation of trout is practised to meet the stocking requirements of streams lakes and reservoirs for angling, and for food. A trout hatchery was established at Rajamalai, 20 km, from Munnar. This hatchery is still the mainstay of the High Range Angling Association. *Salmo gairdnerii* is cultured here.

Acceptable sources of water for a trout farm are springs, streams, rivers and lakes, of which spring water is considered ideal. Due to fluctuation in water temperature throughout the year, water from rheocrene (running) springs and limnocrene (located in depressions) springs are more suitable. There should also be moderate rainfall, moderate gradients, moderate foliage cover, uniform temperature, adequate limestone and other mineral deposits, absence of grazing, mining etc., provision of underground hatchery intake from source of water supply, provision of underground pipelines in the hatchery to minimise temperature changes, and covering of the water supply channels to prevent surface contamination (Jhingran and Sehgal 1978). In Rajamalai trout farm, the water is supplied by the Anamudi stream and almost all conditions mentioned above are maintained here. The optimum temperature ranges between 12°-16°C.

The spawning season of trout varies to with the temperature of the water. For rainbow trout, the spawning season is September to February. Rainbow Trout shows sexual dimorphism (Jhingran and Sehgal 1978), when the sexes attain maturity.

Prior to egg-taking the cock fish (males) and hen fish (females) are kept in separate tubs and the water is changed by fresh drawal from a stream. The egg-taking is done by applying gentle pressure on the belly of the fish. The released eggs and milt are transferred to spawning pans. This is followed by shocking, which is the process of hastening the whitening of infertile eggs, which are otherwise non-discernible, so that they can be removed quickly from the tray. The eggs are agitated to speed up coagulation, by stirring them in the hatching tray with bare hands or siphoning through a common garden hose. After the shock, dead eggs are removed with a pipette. This is called egg-picking.

After the trout eggs are water hardened and counted, they are transferred to a hatchery for incubation. In the Rajamalai hatchery, unpainted concrete is used as trough for incubation. The rate of trout egg development is dependent on water temperature. Incubating eggs pass through several stages of which four are well marked. They are: Green egg, Eyed egg, Sac-fry or Alevin and Swim-up fry.

Sanitation is very important in a trout hatchery. Fungal infection is the greatest foe of trout and is difficult to prevent it from spreading. To avoid this, dead eggs must be carefully removed from the tray every morning. A mixture of salt and potassium permanganate is used to prevent diseases in Rajamalai hatchery. Based on studies conducted in various parts of the world, the most satisfactory results are achieved with malachite green.

Ponds for rearing trout are of diverse sizes and designs. An ideal trout pond is deep with a little current most of the time, but can be readily converted into a shallow swift pond when necessary. The troughs being shallow, fry cannot be kept there for an indefinite period and hence the need to transfer them to nursery ponds. The usual size of a nursery tank in Rajamalai is 5 x 1 x 0.75 m. Once the fry have grown to fingerling size, they are transferred to larger growing ponds and raceways. A raceway is usually an elongated artificial body of water. A natural raceway is like an oblong trench with earth walls and bottoms. Each raceway can be connected to a series of other raceways.

One of the most important aspects of rearing pond management is to assess their carrying capacities in advance so as to determine stocking rates. Oxygen consumption and basal metabolic rate which a given water flow can support are crucial in estimating the quantity of fish in a hatchery.

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